at − 18°. In this respect, again, it differs from the tetrabromide of allylene, which remains liquid when surrounded by a freezing mixture. The constitution was finally proved to be $CH_2{=}C{=}CH_2$, as expected, the tetrabromide being, consequently, $CH_2Br{-}CBr_2{-}CH_2Br$; while allylene possesses the constitution $CH_3{-}C{\equiv}CH$, being, in fact, methyl acetylene, its tetrabromide being, therefore, $CH_3{-}CBr_2{-}CHBr_2$, a substance very different from the tetrabromide of allene.

INVITATIONS have been issued to each maritime nation to send one or more delegates to attend an International Maritime Conference to meet in Washington on April 17, 1889. The objects of the Conference will be to revise the regulations concerning vessels at sea, to adopt a uniform system of signals to indicate the direction in which vessels are moving in fog, snow, or thick weather, and at night, to convey warnings of approaching storms and other important information, and to formulate regulations for the prevention of collisions. The importance of the subject is so great that a full attendance of delegates is expected.

IN the *Archiv der naturwissenschaftl. Landesdurchforschung von Böhmen*, Band vi. No. 5, 1888, is a valuable memoir by Prof. Franz Klapalek under the title "Untersuchungen über die Fauna der Gewasser Böhmens, Part I, Metamorphose der Trichopteren," in which the transformations of nearly twenty species of Bohemian caddis-flies are detailed, with illustrative figures and copious introductory general remarks on the internal and external anatomy of the larvæ and pupæ. The author states that the larvæ may be divided into two sections, which he terms "*raupenförmige*" and "campodeoid" respectively, and which correspond pretty nearly with the divisions "inæquipalpia" and "æquipalpia" employed by systematists for the perfect insects. Prof. Klapálek has been very successful in breeding these insects, a matter always attended with difficulty, more especially with those forms that inhabit rapid streams and torrents. A further series of observations will appear next year.

SOME interesting prehistoric remains have been discovered near Basingstoke. Six urns have been disinterred, and stone implements of very rude form have been found in the field in immediate relation with the vessels, although none have actually been discovered buried with the pottery. The site of the interments is a field adjoining Dummer Clump, a conspicuous landmark in the parish of Dummer, and near Kempshott Park, the seat of Sir Nelson Rycroft, who is the owner of the estate. A shepherd was pitching hurdles, when the bar came in contact with a large stone, which, on being removed, was found to have covered two very rudely-formed vessels, of which the under one was pronounced by Dr. S. Andrews, of Basingstoke, to contain human bones which had undergone incineration. Subsequently, another urn was removed, of a much coarser character, bearing a band round the base of the rim ornamented with sunken dots. All the vessels are hand-made and apparently fire-baked, and the larger ones have suffered some damage from the plough, which must have repeatedly passed over them.

THE new number of the *Internationales Archiv für Ethnographie* (Band i. Heft 5) will fully maintain the reputation of this excellent periodical. Among the contents are an article on arrows from Torres Straits, by Dr. M. Uhle; a note on a singular mask from Boissy Island, North-East New Guinea, and queries on the lizard in the folk-lore of Australasia, by Prof. H. H. Giglioli; and a paper on the chewing of the betel-nut, by F. Grabowsky. The coloured illustrations, as usual, are admirable.

FISHING is to be resumed this season at the Sild oyster-banks, on the coast of Jutland, which have been preserved for six years. The oysters are reported to be plentiful and in splendid condition.

THE additions to the Zoological Society's Gardens during the past week include a Grivet Monkey (*Cercopithecus griseo-viridis* ♂) from North-East Africa, presented by Lord Archibald Campbell; a Rhesus Monkey (*Macacus rhesus* ♀) from India, presented by Major Dudley Buckle, R.A.; a Bonnet Monkey (*Macacus sinicus* ♂) from India, presented by Mr. G. C. Gosling; two Sooty Mangabey Monkeys (*Cercocebus fuliginosus* ♀ ♀) from West Africa, presented by Mr. Edward Felton, R.E.; an Ocelot (*Felis pardalis* ♂) from Pernambuco, presented by Mr. E. Percy Bates; a Weka Rail (*Ocydromus australis*) from New Zealand, presented by Mr. H. Lindsay; a Rose-crested Cockatoo (*Cacatua moluccensis*) from Moluccas, presented by Miss Eve; a Puffin (*Fratercula arctica*) from Cornwall, presented by Mr. J. Muir Drew; a Common Snake (*Tropidonotus natrix*), a Common Slowworm (*Anguis fragilis*), British, presented by Mr. P. S. Hutchinson; a Common Viper (*Vipera berus*), British, presented by Mr. A. H. N. Smith; four European Tree Frogs (*Hyla arborea*), European, presented by Mr. Lionel A. Williams; two Grivet Monkeys (*Cercopithecus griseo viridis* ♂) from North-East Africa, deposited; a White-backed Trumpeter (*Psophia leucoptera*) from the Upper Amazons, received in exchange; two Collared Fruit Bats (*Cynonycteris collaris*), an Axis Deer (*Cervus axis* ♂), a Canadian Beaver (*Castor canadensis*), four Chilian Pintails (*Dafila spinicauda*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

THE SATELLITES OF MARS.—These faint objects have been successfully observed, during the late opposition, with the great telescope of the Lick Observatory. The building operations prevented the observations being carried on systematically, but measures of distance and position of one or both satellites were obtained on nine evenings between April 9 and April 28, and Phobos was seen as late as July 18, when the theoretical brightness of Mars was but one-tenth of what it was at the opposition of 1877, or one-fifth of what it will be at the coming opposition of 1890. A preliminary reduction of the observations gives the following corrections to the times of elongations as given by Mr. Marth in the *Monthly Notices* of the Royal Astronomical Society, and by the *American Nautical Almanac* respectively:—

		Marth. h.		American *N.A.* h.
Phobos	...	+ 0·427	...	− 0·33
Deimos	...	+ 0·020	...	+ 0·35

Mr. Keeler, who made the observations, remarks (*Astr. Journ.*, No. 178) that, so far as his estimates of the brightness of the satellites go, they support Prof. Pickering's conclusion that Deimos is one half-magnitude brighter when on the eastern side of the planet than when on the western.

TOTAL LUNAR ECLIPSE OF JANUARY 28.—No. 4 of vol. xviii. of the Annals of the Harvard College Observatory contains an account of the observations made there of the eclipse of the moon of January 28. The observations were of three classes—first, of the occultations of Dr. Döllen's list of stars; secondly, of the variation in the actinic brightness of the moon; and thirdly, the search, by means of photography, for a possible lunar satellite. In this second inquiry Mr. W. H. Pickering found that the photographic brightness of the full earth was 23·6 times as great as that of the full moon, equivalent to an albedo of 1·7 times that of the moon. The diminution in brightness ascribed to the moon during eclipse is most remarkable, Mr. Pickering giving the uneclipsed full moon as 1,400,000 times as bright as during the central phase, or about *twice* the ratio existing between the sun and full moon. In the search for the satellite a succession of photographs were taken, the telescope being made to follow the moon's motion as closely as possible, so that the stars were represented by short trails. A satellite would have left a trail inclined to the star trails and of a different length. The result of the search was negative, and as a satellite of the tenth magnitude, would have been registered on the plates, it appears probable that the moon has no satellite more than 200 metres in diameter, unless it was involved in the shadow of the earth during the eclipse, or

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was very dark, or was moving with the same speed amongst the stars as the moon, but in the opposite direction, in which case it would have been mistaken for a star.

PHOTOMETRIC OBSERVATIONS OF ASTEROIDS.—It has frequently been suggested that the asteroids, shining by reflected light, and subject, it might be assumed, only to variations the amount of which could be calculated for any required date, would prove specially useful as standards of brightness in the photometric observation of the fainter stars. Mr. Henry M. Parkhurst has carried out recently a series of observations on several of these bodies, which throws considerable light on their suitability for such a purpose. His method of observation was to note the time which the asteroid took to disappear after passing a transit-wire, the telescope being stationary, and the light of the asteroid or comparison-star suffering diminution either by a wedge or more frequently by a deflector—a piece of glass with nearly parallel sides, placed in the telescope tube, about one-seventh of the way from the focus, and covering half the field. The results of Mr. Parkhurst's observations, which embraced eighteen asteroids, and extended over nearly nine months—April to December 1887—are given in No. 3 of vol. xviii. of the *Annals of the Harvard College Observatory*, and show that the asteroids are not appreciably self-luminous, and that the sun undergoes no noteworthy fluctuations in light in periods of a few days; nor, as a comparison with observations made in some former years would indicate, in more lengthened periods. But they also show that the phase-correction is not covered by allowing simply for the decrease in the area illuminated—a further correction is needed, and one peculiar to each asteroid. In two cases, also, Harmonia and Iris, several of the observations stand out in strong contrast to the rest, and appear to indicate a variation due to axial rotation, the planet probably being irregular in shape, or its surface in reflecting power. No variation depending, as in the case of Saturn's ring, on the position of the asteroid in its orbit, and the relative position of the earth, has been noticed, but this inquiry has only been extended to the four asteroids first discovered. The mean error of an observation, when the special phase correction and probable variations due to rotation have been allowed for, appears to be less for an asteroid than for the fixed stars, the mean error of an observation of the solar illumination in the inquiry referred to above being given as 0·116m.

NEW CATALOGUE OF VARIABLE STARS.—Nos. 179 and 180 of *Gould's Astronomical Journal* contain a new catalogue of variable stars by Mr. S. C. Chandler. Mr. Chandler is not only a diligent observer of variable stars, the discoverer of several, and a zealous computer of the elements of their variations, but several years ago undertook an important and much-needed work, viz. the complete study of the bibliography of known and suspected variables. This catalogue coming from his hand, therefore, will be especially valuable, and the more welcome since it is thirteen years since Schönfeld published his second catalogue. Mr. Chandler puts it forward as merely a preliminary publication, a second more definitive being designed to follow as soon as the investigations now in hand shall have been completed. The present catalogue is no mere compilation. Almost every star in it visible from the latitude of Boston has been observed by Mr. Chandler, who has also gathered together and discussed every available published observation. The catalogue embraces 225 stars, and of these the variations of 160 are distinctly periodic; for 12 the periodic character is ill-defined, 14 are irregular, 12 are Novæ, and the remainder have been too little observed for the character of the variation to be properly known. Of the 160 periodic stars, the elements of 124 are the results of Mr. Chandler's own work, 22 are Schönfeld's, and 14 those of other computers after Mr. Chandler had carefully confirmed them. A point sure to lead eventually to an important advance in our knowledge of the cause of variation has received much attention from Mr. Chandler, viz. the systematic perturbations shown by so many of the periods, and a table is given of these inequalities for 26 stars. A useful novelty is introduced in the numeration of the stars of the catalogue, for, instead of giving them consecutive numbers, each is distinguished by a number equivalent to one-tenth of its R.A. for the mean equinox of 1900·0, expressed in seconds of time, thus securing that the numeration need not be disturbed by fresh discoveries.

MINOR PLANET NO. 275.—This object has been named Sapientia.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1888 *OCTOBER* 7-13.

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on October 7

Sun rises, 6h. 13m.; souths, 11h. 47m. 40·2s.; sets, 17h. 22m. right asc. on meridian, 12h. 53·9m.; decl. 5° 46′ S. Sidereal Time at Sunset, 18h. 29m.

Moon (at First Quarter October 12, 5h.) rises, 8h. 18m. souths, 13h. 38m.; sets, 18h. 46m.: right asc. on meridian, 11h. 44·6m.; decl. 10° 51′ S.

Planet.	Rises. h. m.	Souths. h. m.	Sets. h. m.	Right asc. and declination on meridian. h. m.	° ′
Mercury..	8 47 ...	13 19 ...	17 51 ...	14 25·7 ...	17 24 S.
Venus ...	8 27 ...	13 17 ...	18 7 ...	14 23·4 ...	14 7 S.
Mars ...	12 18 ...	16 3 ...	19 48 ...	17 9·5 ...	24 33 S.
Jupiter ...	10 50 ...	15 2 ...	19 14 ...	16 9·2 ...	20 28 S.
Saturn ...	0 46 ...	8 16 ...	15 46 ...	9 21·8 ...	16 17 N
Uranus...	6 27 ...	11 59 ...	17 31 ...	13 5·2 ...	6 17 S.
Neptune..	19 10*...	2 56 ...	10 42 ...	4 1·3 ...	18 54 N

* Indicates that the rising is that of the preceding evening.

Occultations of Stars by the Moon (visible at Greenwich).

Oct.	Star.	Mag.	Disap. h. m.	Reap. h. m.	Corresponding angles from vertex to right for inverted image ° °
11 ...	B.A.C. 6524 ...	6½ ...	20 35 ...	21 17 ...	72 0
12 ...	B.A.C. 6889 ...	6 ...	19 53 ...	21 6 ...	110 311
13 ...	20 Capricorni ...	6 ...	19 5 ...	19 55 ...	153 240

Oct.	h.	
7 ...	4 ...	Venus in conjunction with and 5° 6′ south of the Moon.
7 ...	5 ...	Mercury in conjunction with and 8° 8′ south of the Moon.
8 ...	6 ...	Mercury at greatest elongation from the Sun 25° west.
9 ...	1 ...	Jupiter in conjunction with and 3° 33′ south of the Moon.
9 ...	22 ...	Mercury in conjunction with and 3° 9′ south of Venus.
10 ...	3 ...	Mars in conjunction with and 4° 38′ south of the Moon.
10 ...	13 ...	Uranus in conjunction with the Sun.

Saturn, October 7.—Outer major axis of outer ring = 38″·9 outer minor axis of outer ring = 9″·8: southern surface visible.

Variable Stars.

Star.	R.A. h. m.	Decl. ° ′			h. m.	
U Cephei	0 52·4 ...	81 16 N. ...	Oct.	6,	3 52	*m*
			,,	11,	3 32	*m*
Algol	3 0·9 ...	40 31 N. ...	,,	5,	1 8	*m*
			,,	7,	21 57	*m*
R Aurigæ	5 18·3 ...	53 28 N. ...	,,	7,		*m*
T Monocerotis ...	6 19·2 ...	7 9 N. ...	,,	10,	5 0	*m*
U Monocerotis ...	7 25·5 ...	9 33 S. ...	,,	12,		*m*
S Cancri	8 37·5 ...	19 26 N. ...	,,	11,	0 27	*m*
R Crateris	10 55·1 ...	17 43 S. ...	,,	7,		*m*
U Ophiuchi... ...	17 10·9 ...	1 20 N. ...	,,	11,	19 0	*m*
β Lyræ...	18 46·0 ...	33 14 N. ...	,,	7,	0 0	*M*
S Sagittarii	19 12·9 ...	19 14 S. ..	,,	11,		*M*
S Vulpeculæ ...	19 43·8 ...	27 1 N. ...	,,	11,		*m*
χ Cygni	19 46·3 ...	32 38 N. ...	,,	9,		*m*
η Aquilæ	19 46·8 ...	0 43 N. ...	,,	12,	21 0	*M*
R Sagittæ	20 9·0 ...	16 23 N. ...	,,	11,		*m*
T Vulpeculæ ...	20 46·7 ...	27 50 N. ...	,,	12,	2 0	*M*
Y Cygni	20 47·6 ...	34 14 N. ...	,,	8,	3 0	*m*
			,,	11,	3 0	*m*
δ Cephei	22 25·0 ...	57 51 N. ...	,,	7,	20 0	*M*

M signifies maximum; *m* minimum.

Meteor-Showers.

	R.A. °	Decl. °	
Near η Persei	42 ...	55 N. ...	Slow.
,, θ Geminorum ...	102 ...	34 N. ...	Swift; streaks.
	135 ...	80 N. ...	Swift; streaks.
,, κ Cephei	305 ...	77 N. ...	Slow; faint.

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